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| 10/612,149 | 07/03/2003 | Takeshi Masuda | 026390-00009 | 3313 |

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| EXAMINER |
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ZERVIGON, RUDY

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| ART UNIT | PAPER NUMBER |
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1763

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/612,149

Applicant(s)

MASUDA ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “S” has been used to designate both substrate (W; Figure 7) and a dimension. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 11 recites the limitation “inner wall”. There is insufficient antecedent basis for this limitation in the claim.

5. Claims 6-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

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the invention. Claims 6, 8, and 10 require a claim elements "10Torr The diameter of the substrate to be processed". It is uncertain what this quantity is.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4, 11, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Okase; Wataru (US 5,884,009 A). Okase teaches a film-forming apparatus (Figure 7; column 15, lines 6-67), which comprises a gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) for admixing a raw gas (75a,b; Figure 7; column 15, lines 6-67) and a reactive gas (75a,b; Figure 7; column 15, lines 6-67), a film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) connected to the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67), a shower head (7c; Figure 7; column 15, lines 6-67) disposed on the top face of the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) and a stage (61; Figure 7; column 15, lines 6-7) arranged in the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) for placing a substrate (W; Figure 7) to be processed and capable of freely going up and down (60, 64; Figure 7; column 14; lines 30-45) and in which a gas (75a,b; Figure 7; column 15, lines 6-67) mixture prepared in the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) is introduced into the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) through the shower head (7c; Figure 7; column 15, lines 6-67) to thus form a film on the substrate (W; Figure 7), the apparatus

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(Figure 7; column 15, lines 6-67) being characterized in that the gas (75a,b; Figure 7; column 15, lines 6-67) mixture prepared in the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) is supplied to the shower head (7c; Figure 7; column 15, lines 6-67) through a supply port disposed at the peripheral portion (perimeter 73b; Figure 7 - 72 permits radial flow - column 15, lines 17-25) on the bottom face of the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) so that the gas (75a,b; Figure 7; column 15, lines 6-67) mixture prepared in the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) and fed to the shower head (7c; Figure 7; column 15, lines 6-67) through the peripheral portion (perimeter 73b; Figure 7 - 72 permits radial flow - column 15, lines 17-25) on the top face of the shower head (7c; Figure 7; column 15, lines 6-67) flows towards the central portion of the shower head (7c; Figure 7; column 15, lines 6-67), as claimed by claim 1

Okase further teaches:

- i. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein an exhaust port (45; Figure 7) for discharging the exhaust gas (75a,b; Figure 7; column 15, lines 6-67) from the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) is disposed on the side wall (71; Figure 7) of the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) and below the level of the stage (61; Figure 7; column 15, lines 6-7) upon the film-formation so that the exhaust gas (75a,b; Figure 7; column 15, lines 6-67) generated in the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) is directed and guided towards the side wall (71; Figure 7) of the chamber and discharged through the exhaust port (45; Figure 7) arranged on the side wall (71; Figure 7), as claimed by claim 2

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- ii. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1 or 2, wherein when the flow rate of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is large, the shower conductance is small and the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is injected into the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) from the central portion of the shower head (7c; Figure 7; column 15, lines 6-67) (hereunder referred to as "central gas (75a,b; Figure 7; column 15, lines 6-67) injection") upon the formation of a film, the apparatus (Figure 7; column 15, lines 6-67) is so designed that it comprises a shower head (7c; Figure 7; column 15, lines 6-67) having a large diameter, that the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is increased or that a shower head (7c; Figure 7; column 15, lines 6-67) having a large diameter is used and the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is increased, to thus prevent the central gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture and to make the manner of a gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture uniform, as claimed by claim 3. The entirety of Applicant's claim 3 is an intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior

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art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- iii. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1 or 2, wherein when the flow rate of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is small, the shower conductance is large and the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is injected into the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) from a shower head (7c; Figure 7; column 15, lines 6-67) and into a region above a substrate (W; Figure 7) to be processed from the periphery of the shower head (7c; Figure 7; column 15, lines 6-67) (hereunder referred to as "peripheral gas (75a,b; Figure 7; column 15, lines 6-67) injection") upon the formation of a film, the apparatus (Figure 7; column 15, lines 6-67) is so designed that it comprises a shower head (7c; Figure 7; column 15, lines 6-67) having a small diameter, that the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is reduced or that a shower head (7c; Figure 7; column 15, lines 6-67) having a small diameter is used and the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is reduced, to thus prevent the peripheral gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture and to make the manner of the gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture uniform, as claimed by claim 4. The entirety of Applicant's claim 4 is an intended use of the pending apparatus claims. Further, it has

been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- iv. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein a gas ring (76; Figure 7; column 14; lines 30-45) is disposed at the periphery of the top face of the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) so that an inert gas (77; Figure 7; column 15, lines 6-67), which is not directly involved in the film formation, can uniformly be introduced into the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) through the gas ring (76; Figure 7; column 14; lines 30-45) and along the inner wall surface of the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67), as claimed by claim 11
- v. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein the film-forming apparatus (Figure 7; column 15, lines 6-67) is one according to MOCVD, as claimed by claim 12. Applicant's claim requirement of "is one according to MOCVD" is a claim requirement of intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use

must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase; Wataru (US 5,884,009 A). Okase is discussed above. Okase does not teach the relative dimensions of Okase's showerhead (7c; Figure 7; column 15, lines 6-67) diameter vs. Okase's film forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) diameter as claimed by claims 5. Okase does not teach the relative distance between Okase's substrate (W) and Okase's showerhead (7c; Figure 7; column 15, lines 6-67) as claimed by claims 7. Okase further does not teach the operating parameters of pressure and gas flow in the range of the claimed inequalities – claim 6, and 8-10.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize Okase's relative apparatus dimensions and Okase's operating parameters.

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Motivation to optimize Okase's relative apparatus dimensions and Okase's operating parameters is for generating uniform thickness of deposited films as taught by Okase (column 13, lines 20-30). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05). Further it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04)

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okase; Wataru (US 5,884,009 A) in view of Reimer; Paul et al. (US 6817377 B1). Okase is discussed above. Okase does not teach a film-forming apparatus (Figure 7; column 15, lines 6-67), which comprises a load-lock chamber for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67); a conveyer chamber positioned between the load-lock chamber and the film-forming chamber (between 61 and 7c; Figure 7; column 15, lines 6-67) - claim 12.

Reimer teaches semiconductor processing apparatus (Figure 1) including a load-lock chamber (25c) for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-

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forming chamber (25a); a conveyer chamber (25b) positioned between the load-lock chamber (25c) and the film-forming chamber (25a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Okase's apparatus.

Motivation to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Okase's apparatus is for process automation as taught by Reimer (column 1; lines 10-13).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 20050059246 A1

US 20050056217 A1

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.



12/11/15